

## Disability Visibility Podcast

### Episode 91: Disabled Engineers

Guest: Emily Ackerman

Host: Alice Wong

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### Introduction

[hip-hop beat with radio static]

LATEEF MCLEOD: This is the *Disability Visibility Podcast* with your host, Alice Wong.

ALICE WONG: Greetings microorganisms, humanoids, cyborgs, and robots. Welcome to the *Disability Visibility Podcast*, conversations on disability politics, culture, and media. I'm your host, Alice Wong. Today's episode features an interview with Emily Ackerman, a doctoral candidate in chemical engineering at the University of Pittsburgh and a disabled activist. Emily will talk about how she got into chemical engineering, her advice for disabled students who want to be scientists, her experiences last year on campus with a delivery robot, and the importance of accessibility in the design and development of technology. Are you ready? Away we gooooo! [electronic beeping]

ELECTRONIC VOICE: 5, 4, 3, 2, 1.

ALICE: Emily, thank you so much for being on my podcast today.

EMILY ACKERMAN: Yeah, thank you.

ALICE: So, Emily, why don't you introduce yourself and share anything you'd like about your background.

EMILY: Sure. So, my name's Emily Ackerman. I use she/her pronouns. I am a 6th-year PhD candidate at the University of Pittsburgh. And I'm a chemical engineering student, but I do systems biology in my research. So, it's a little bit of biology, a little bit of math. I have some more like robotics and control theory training. I'm a little bit all over the place, and everything I do is computational. As a disabled scientist, I love being computational. And yeah, so, I'm a grad student. That's kind of my life. But I spend a lot of time with my cat. I love my cat. And I spend a lot of time organizing in several capacities. Academically, I organize the graduate student workers at my university. We've been trying to get our union recognized for several years now. I also do some more in disability organizing, as well as I've just kinda moved into scientific kind of advocacy as far as mental health goes and working on kind of organizing issues, labor issues in early career researchers in STEM. So, I'm kind of all over the place.

ALICE: I love it!

### What is chemical engineering

ALICE: And I believe you wrote or described yourself as a PhD student in chemical engineering at the University of Pittsburgh. And for people who don't understand what is chemical

engineering like me, could you describe that? And just, you mentioned you love the computational aspects. So, can you kinda describe a little bit more, what does that mean, what's involved?

EMILY: Sure. Yeah, so chemical engineering is kind of a catch-all. We do a lot of stuff. You can think of us as chemists who like math, maybe or people who have interests in energy or biology or clean solutions or just strict chemistry and things like that. So, we have a really wide range of fields. So, I'm in the more biological side, and we kind of organize ourselves by being experimental or computational. So, experimental are people who work in labs, what you would typically think of as like a scientist or an engineer. But there's this new group of us who work computationally, and we try to make models or develop algorithms to understand systems. So, in my case, I work with respiratory viral infections like the flu and like COVID-19. And I try to develop models to understand how it works, develop new drug targets, or understand the mechanisms of how maybe the virus is able to take over and infect lots of cells. And so, yeah, chemical engineering is a very kind of wide, wide field.

And I entered it because I was in high school, and we make high schoolers decide what to do with their lives, right? And I liked chemistry, but I was pretty worried. So, for reference, I'm in a wheelchair. I weigh about 50 pounds. I'm very small, and I'm very weak. And the kind of physical demands of lab work don't align with my physical abilities at all. No amount of adaptation is probably gonna make that happen. And I went into chemical engineering because I liked chemistry, but said I'd rather be at a desk or doing some kind of mathematical version of it. And that's kind of how I got into it.

And I didn't really know at the time how many doors I could open by staying computational. I kind of thought that I was maybe gonna be doomed to some kind of desk job at a factory or something for a long time. But by chance, I met with a professor who told me that there's this whole field of computational science, and that really opened those doors for me for different applications I could have with my love of science. And so, that's kind of how I ended up here on a very roundabout path.

[ambient electronica music break]

### Advice for disabled students interested in engineering or science

ALICE: You described like there are different ways of pursuing your interests in a way that works for you. So, what is your advice for any kinda disabled student, no matter what kind of disability they have, that's thinking about engineering or going into science in general and kinda not sure yet about can I do this, or how to started. What's your advice to people who questioning or just kind of unsure of themselves?

EMILY: Yeah, I think a big part of my journey has been.... I have this motto that I try to live by, which is like, what do you need? And asking for what you need has been one of the most important things that I've found in life, but particularly in school and in the academic space. Because there isn't, I guess the problem is there isn't representation. I've never had a visibly disabled role model in academia, and as a result, there isn't much offered as far as people who are readily available to provide things that you need without asking. And asking is really tough. And I wish that we didn't have to learn to be so resilient and to ask for things that we need, but it really is important. For example, accommodations in the classroom: I didn't use them until the middle of my undergraduate career, because internalized ableism had told me that I didn't need them, that I was smart and that I didn't need any help and that I was just gonna do it. Which just wasn't true. I don't write fast. I get very tired. I need to take breaks. And when I finally got those

accommodations, I felt so much more confident and sure of myself because I had what I needed to survive and to succeed.

And I know a lot of people who are in the same boat where they are not feeling like they deserve to go to the disability office to get accommodations or to ask their professors for help in some way. But it's really, you deserve to have that. If you want to be there, you have every right to go there. And you have every right to the adaptations and the accessibility that you need to succeed just like everyone else.

And I guess one example that I would like to share, 'cause I think this was really beneficial to me, and I don't think I've seen it anywhere else, as an engineer, we had requirements in undergrad for labs that we had to take. And this was kind of in the later half of my undergraduate career, but so I was feeling a little more confident. I said I can't do this. I don't want to just have a lab partner because it's not fair to either of us for them to be doing the physical work of two people. And so, my university hired a student who had already taken the class to basically be a machine for me. And I would say, "Measure out to mls of hydrochloric acid," or whatever, and they would do it. And they would follow my direct instructions. I was learning exactly as I would've if I was physically doing it. But I was safe, and I was able to focus on the science instead of if I was able to do it and if people were upset with me and if I was in the way or whatever, it just removed those barriers. And so, I would really like to see more of that: more understanding of what accessibility means and how we can provide it and how abled people can provide it easily and without much fuss in their classrooms.

ALICE: Yeah, and I think this is even more of an issue in terms of graduate education. Because I think at the graduate level, I think the pressure is really on. And accommodations, sometimes unfairly, are seen as shortcuts or special treatment.

EMILY: Right.

ALICE: And the idea that this would take away from your qualifications and the supposed requirements that you need in order to complete your education. And people don't see how accommodations are just so necessary, and it doesn't make you any less than compared to non-disabled students. And I think like you mentioned, about internalized ableism, you know, that's where the tension is, where you want to keep proving that you know you're just as good, but you just are worried about how other people will perceive you just by asserting your right to have accommodations.

EMILY: Right.

### **Ableism, racism, sexism, and classism in academia**

ALICE: Since you are in grad school, and we talked earlier before we started recording that you wanna get into academia after you get your PhD. Academia is still a pretty ableist place, and it tends to be pretty racist and sexist and classist.

EMILY: Yes.

ALICE: So, what do you hope to kinda tear down and smash as an academic, in terms of really creating more space for disabled people in academia?

EMILY: Right. Yeah, the trend recently is the diversity, right? They want to tout numbers of percentages of students that are enrolled or a percentage of faculty. And the focus is not on the equity. It's on getting people there, and then the support is non-existent. And to me, I mean,

that's not acceptable first of all. But to me, I hope to foster it in spaces that I occupy, and I hope to kinda spread that kind of mindset that, you know, it doesn't need to be that way. There are lots of things that we can individually do as far as mentoring and working with marginalized communities in our community. But there's also things we can do institutionally, right? I'm a big fan of taking lots of people's power collectively and challenging institutional standards. What is your institution, whether it's a school or your company or whatever community has power, what are they doing? And how can we force them to listen? And collective power is the way to do that. Which is why I'm so committed to unionizing academic spaces, because that is a huge way to get the protections and really the quality of life that we need to focus on doing our academic work.

[ambient electronica music break]

### Encountering robots on campus

ALICE: I first came across your work when I saw on Twitter last fall, a piece that you wrote for CityLab about your experiences encountering robots on campus. And can you describe these robots who are created by Starship Technologies and what you wrote about in your article?

EMILY: Sure. So, last year, over the summer, there were these small robots there. They sort of resemble large white coolers on wheels with a little flag that sticks up. They're about like mid-sized dog-sized, if that's helpful. And they popped up over not this summer, but the last summer with a human that was driving them around, and they were unmarked. Just kind of you could tell that the person was controlling the robot, but it was pretty unclear what it was doing. And then when the semester started in the fall, 2019, the robots were suddenly by themselves, and it became clear that they were autonomous food delivery vehicles. So basically, the school employed or contracted this company who targets universities across the U.S. to release these food delivery robots that will deliver food from the campus dining services to essentially wherever you are on an app. And they kind of cause an interesting, I feel like an interesting social thing, because they're a little bit cute in that they kind of be-bop around. And they're always in the way. They stop randomly. If you stand in front of them now, they yell at you. But they used to just kind of stop and wait. And people would kinda play with them, and they were just generally all over the place.

And one day I was waiting to cross pretty busy street. It's like a four-lane street on our campus. And there was a group of people waiting in front of me to cross the street. And when the light turned, I couldn't see through the people because I'm at like waist height. But they started walking, so I started crossing the street behind them. And when I got maybe halfway across, some of them kinda cleared out, and I realized that one of these robots was sitting directly in the curb cut about one or two inches from the edge of the street. But it wasn't moving. And it was a one person-wide curb cut. And so, I walked up to it, and I kinda looked at it and was like, OK, well, I have some robotics training. I understand if I sit in front of it or if I stop, it's definitely not going to move. It's not going to back up 'cause it doesn't have sensors. So, I can't sit in front of it. But I'm in the street, and I'm blocked. So, I needed to make a decision whether I should cross back across four lanes of traffic or what. Because the light was changing back to green for the cars.

And I panicked. I was super freaked out. And I kind of like swerved around it a couple times, and it still didn't move. So, I ended up hopping the curb next to it where the ramp isn't a ramp anymore. And so, that's not great for me. It is painful, first of all. I could get stuck, I think, fairly easily. And also, that ramp is there for me. And so, I just sat and looked at it for a minute, and I was incredulous at what was happening to me. And I turned around and kept walking. And later

on, I crossed another street. I looked back. People were crossing that intersection again, and it was just sitting in the same spot, not moving. And I was just beside myself because I was endangered by something that I didn't even know that I was there in a sentient way and didn't understand that I was a human and that I needed to get onto that ramp. And so, I walked back to the coffee shop I was going to, and I screamed inside the coffee shop at my friend so loud that I scared an entire coffee shop. And then I was like, I have to do something about this, because it's just it's going to keep happening if I don't.

And so, I wrote some angry tweets, as I love to do, and I tagged the university and the company and was like, what are you gonna do about this? And that day, the company and the university decided to pull them off the streets and kind of investigate what had happened to me. And so, kind of where my article comes in is that from that day on, for the next few days, my life was kind of a whirlwind. It blew up on Twitter essentially, and people were sharing all kinds of examples of the same robot in different campuses or different robots that function very similarly, doing essentially the same thing to them. And at the same time, the news was calling me 'cause I had caused kind of a ruckus in the city. And the company was calling me, trying to explain to me what had happened and explain their commitment to our community at large, I guess, and explain to me that they had already talked to visually impaired focus groups and that they had no problems with it. And so, they were confused, I guess, at why I was so upset.

And it was kind of this whirlwind where I was put in the middle of this conversation that really hadn't been happening prior to that. It became very clear to me that I was now the expert because I was the first person to bring it to the public's attention, which I didn't intend to be. But it was just, it was wild. And then the next day, the company had kind of retracted their apology because they said that they viewed the video and that I went around it, which I did. But by not really supplying any details and not giving me a chance to say anything, I guess, the Internet turned into a very scary place where I was demonized for ruining something good, for "lying," quote-unquote. And I woke up to hundreds of ableist comments and memes and calling me by name in threads and things. And it was just a complete 180 that really made me doubt the way that I felt about this experience and doubt my validity in claiming that I was in danger and that there was ableism at play here. And yeah, it was a wild experience.

But out of that came this kind of op ed that I got to write, among some other things, where I basically make a case for why we have to make more ethical design decisions and why we need to have representation in the tech industry, which is kind of very quickly headed for a future that is leaving us behind.

[ambient electronica music break]

## Ethical design

ALICE: Yeah, and what do you mean by ethical design? One of the things that you experienced, which is so unfortunate, is that it took you experiencing danger to have to speak out about it.

EMILY: Right.

ALICE: And the fact that you were gaslit basically and the enemy of progress. You know, I feel like this is another thing that's really icky about the tech industry, is the fact that there can't be critique.

EMILY: Mmhmm.

ALICE: Somehow pointing out things that are super problematic are not seen as oh, we didn't even realize this. Or oh, that's, you know. There's a lotta lip service toward diversity and commitment to the disability community. But there's no actions in place to actually make that happen. So, what do you mean by ethical design? And can you speak to kind of the ideal situation for the development of tech and other products and services that would be more inclusive and less ableist?

EMILY: Yeah, I think there's a lot of space to make progress in different areas of the tech industry, but also in the way we view tech in our lives and the way that we...kind of the path that we have set out as the only path to getting into the tech industry. And so, I guess when I say ethical design, I really mean thinking about ethics in all parts of this equation, right? So, I think about who's in the tech industry right now. Not me, right? Or at least not at the rate that I would like to be. People who look like me are much less likely to be working at big name tech companies. And it really presents an issue when user design, which is kind of human-centered, is solely performed by able white males. Because when we think about users, we think about ourselves first.

And I always think about how early in the process of designing, for example, Starship robots, I would've flagged them and been like, "Hey, this is gonna be a problem for a lot of people." And maybe this is my internalized ableism again, but there's part of me that can't blame them to a certain extent where I don't want people to be responsible for foreseeing the experience of someone they've never met or someone they don't know or they don't know exists because we shouldn't be responsible for that. But knowing that is not an excuse, and everything that we do need to be actively working towards fixing that problem. And so, I kind of see this as a cycle where, yes, things are not good right now, but this is just a temporary issue that we can be constantly working to fix. And when we frame it as temporary, we can think of it as solution-based practices.

So, to me, I mean, anyone in tech wants to have better tech, right? But to me, as a disabled person, better tech is more accessible tech. And so, when I'm thinking about design and the ethics of design, I'm thinking about how can my solutions be more accessible. And not just that, but if I come up with a solution, is it actively inaccessible or is it actively harmful? And asking these questions kind of early in the design process as opposed to late, when we have to rely on the user giving feedback—or in my case, not the user, but a bystander—and that user needs to rely on the company to listen, right, to do something about the problem.

ALICE: Yeah, it's a real issue of power dynamics where designers, developers are like this heteronormative, white, male, non-disabled people, whether that's accurate or not. But I think they do uphold these norms in what they create. And that users are often relegated as almost like a secondary or afterthought in terms of their feedback and their expertise. And it's not just expertise based on lived experience. It's actual technical expertise as well.

[ambient electronica music break]

ALICE: Today we're speaking on September 29<sup>th</sup>, and you gave a talk, actually, today on the accessibility gap for tech users and developers. And can you tell me a little bit more about how we can narrow this gap? Because first of all, these two groups, users and developers, are not completely mutually exclusive. What are some of the suggestions on how to narrow the gap and how to actually have more of a sphere of co-creation and co-design?

EMILY: I kind of give this disclaimer in my talk where, I'm one girl, and I don't know how to change these institutions that are so ingrained in ableism. But I do have three guiding principles

for the way that we can kind of speed this up. So, the first I see as education has to be more accessible. I mean, this can be we can make changes in our own communities based on what's available to us. So, how can you help, for my academics and researchers, how can your department be more accessible? Can it bring speakers in to talk about marginalized communities and their experience in your industry? Do you hire young students from marginalized communities that maybe don't get research opportunities at the same rate or from institutions that are underrepresented like HBCUs and things? Another question is, do you have disabled role models? Because if your children see this normalized vision of disabled people in education and in tech, which is, in some circles, seen as kind of the end-all of academic experience, it's going to be normalized for them. And they're going to grow up and maybe go into that field and think about these things. So, that's education's a big part.

The second thing I always say is, we have to diversify but support and find real equity in that support. Supporting your coworkers, supporting marginalized communities in your designs and in the things that you put into public. And bringing us in actively instead of waiting for us to complain about what's harmful to us. So, that's a huge one. And then last, this one's pretty controversial in our community, but we have to slow down. The tech industry is moving so fast that they're not thinking before they put things on the street. And now it's out there, and it's too late. And we can't necessarily take it back.

And so, it's hard because we live and function in capitalism, where the focus is on being first and making money and getting your name and your career in science and STEM. But when it comes at the expense of the marginalized, it's no longer good. It's not even neutral. It's just harmful, and it's just unacceptable. And so, if we slow down and really think about the intention of our designs and of our work and how we can make it accessible physically and in education and understanding how it works, I think that's the best way for tech to really reach this kind of equitable state that I know it can eventually reach.

ALICE: So, Emily, thank you so much for speaking with me today.

EMILY: Yeah, thank you. This was great.

## Wrap-up

[hip hop music]

ALICE: This podcast is a production of the *Disability Visibility Project*, an online community dedicated to creating, sharing, and amplifying disability media and culture. All episodes, including text transcripts, are available at [DisabilityVisibilityProject.com/Podcast](https://DisabilityVisibilityProject.com/Podcast).

You can also find out more about Emily on my website.

The audio producer for this episode is me, Alice Wong. Introduction by Lateef McLeod. Theme music by Wheelchair Sports Camp.

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Thanks for listening, and see you on the Internets! Byeeee!